RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE: February 1999

BUDGET ACTIVITY: 7 - Operational System Development

PE NUMBER AND TITLE: 0702207F Depot Maintenance (Non-If)

PROJECT: 3326

COST *($ In Thousands)*	FY 1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	Cost to Complete	Total Cost
3326 Precision Measurement & Calibration	1,387	1,496	1,500	1,529	1,546	1,572	1,603	1,631	Continuing	TBD
Quantity of RDT&E Articles	0	0	0	0	0	0	0	0	0	0

(U) A. Mission Description

This program develops, tests, and evaluates national and Air Force measurement standards and calibration equipment in support of all Air Force programs and activities, including 119 Precision Measurement Equipment Laboratories (PMELs) worldwide. Metrology research and development provides technology to support systems in all phases of development and acquisition, as well as Air Force R&D laboratories, test ranges, ground test facilities, and operational weapons systems support. Rapidly changing technology requires continuing research and development of measurement standards and calibration equipment to ensure modern weapon systems meet Air Force readiness objectives. This program addresses all metrology disciplines and includes the technology areas of laser, infrared, microwave, millimeter wave, optical, physical, mechanical, electrical, electronic, and ionizing radiation measurements. Metrology is a technical discipline devoted to the science of measurements and to the study and improvement of measurement technology. Measurements are the foundation of military system development, quality assurance, hardware conformance testing and system readiness tests. The integrity of these tests is assured through calibration and traceability assurance schemes. The capability to measure and calibrate must parallel the emergence of new technology, new ranges, and new capabilities of military systems. Lack of new measurement capability impedes or blocks the successful exploitation of new technologies, especially in the movement from development laboratory to production to deployment. R&D efforts are essential within the DoD to pace these requirements, otherwise, these same new systems will suffer time delays, excessive cost, and increased risk due to unreliable test results in all phases of development, production, deployment and operation.

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(U) FY 1998 ($ in Thousands):

–	(U)	$792	Complete development of a high sensitivity pyroelectric radiometer, and an improved blackbody pyrometer; and begin development of a portable cryogenic radiometer to characterize infrared test chambers. Continue development of other national measurement standards to support Air Force infrared / laser / electro-optical weapon systems and support equipment.
–	(U)	$205	Complete the microwave high power standards and continue development of microwave standards for noise figure measurements and radar cross-section test range measurements to support radar and RF communication systems.
–	(U)	$145	Begin development of methods to characterize micro-electromechanical sensors (MEMS) and continue development of improved methods to reduce coordinate measuring machine (CMM) measurement uncertainty.
–	(U)	$180	Begin development of methods to determine the frequency response characterization of capacitors; and continue development of national standards for electrical resistance and development of high speed pulse measurements to support high accuracy electronic test equipment.
–	(U)	$65	Begin the large area alpha radiation source metrology project, and continue to develop national standards and National Institute of Standards and Technology (NIST) traceability for calibration of ionizing radiation hazard instrumentation.
–	(U)	$1,387	Total

(U) FY 1999 ($ in Thousands):

–	(U)	$685	Complete the development of an improved blackbody calibrator for the AF Primary Standards Laboratory, an enhanced electrical substitution radiometer, tunable lasers for radiometry and detector standards for long wavelength infrared measurements; begin the tunable diode laser for fiber optic metrology and radiance response with uniform sources projects; and continue development of other national measurement standards to support Air Force infrared / laser / electro-optical weapon systems and support equipment.
–	(U)	$266	Begin development of an upgraded microwave high power system and continue development of standards for radar support, RF communications systems, and radar cross-section range measurements.
–	(U)	$125	Complete development of methods to characterize micro-electromechanical sensors (MEMS) and continue development of improved calibration support for coordinate measuring machines (CMMs).
–	(U)	$305	Begin development of improved thin film multijunction thermal converters and continue development of standards for electrical measurements to support high accuracy electronic test equipment.
–	(U)	$65	Complete the beta measurement traceability project, continue the large area alpha radiation source metrology project and the development of national standards for calibration of ionizing radiation hazard instrumentation.
–	(U)	$50	Identified as source for SBIR
–	(U)	$1,496	Total

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(U) FY 2000 ($ in Thousands):

–	(U)	$697	Begin collimated infrared irradiance radiometer project to calibrate infrared target simulators and continue development of national measurement standards to support Air Force infrared / laser / electro-optical weapon systems and support equipment.
–	(U)	$260	Complete the upgrade to the microwave high power system and continue development of standards for radar support, RF communications systems, and radar cross-section range measurements.
–	(U)	$170	Continue development of improved calibration support for coordinate measuring machines (CMMs), and continue development of standards to support physical, mechanical and electro-mechanical support equipment.
–	(U)	$340	Complete the fast electrical pulse calibration and standards project and continue development of standards for electrical measurements to support high accuracy electronic test equipment.
–	(U)	$33	Complete the large area alpha radiation source metrology project and continue the development of national standards for calibration of ionizing radiation hazard instrumentation.
–	(U)	$1,500	Total

(U) FY 2001 ($ in Thousands):

–	(U)	$716	Complete the tunable diode laser for fiber optic metrology project and continue development of national measurement standards to support Air Force infrared / laser / electro-optical weapon systems and support equipment.
–	(U)	$265	Continue development of standards for radar support, RF communications systems, and radar cross-section range measurements.
–	(U)	$170	Complete development of improved calibration support for coordinate measuring machines (CMMs), and continue development of standards to support physical, mechanical and electro-mechanical support equipment.
–	(U)	$345	Complete the Hall effect resistance standard project, the frequency response characteristics of capacitors projects and the improved thin film multijunction thermoconverter project; and continue development of standards for electrical measurements to support high accuracy electronic test equipment.
–	(U)	$33	Continue the development of national standards for calibration of ionizing radiation hazard instrumentation.
–	(U)	$1529	Total

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(U) B. Budget Activity Justification: This program is in budget activity 7 - Operational System Development because it supports operational systems.

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(U) C. Program Change Summary ($ in Thousands)

	FY 1998	FY 1999	FY 2000	FY 2001	Total Cost
(U) Previous President's Budget FY 1999 PB	1,397	1,500	1,528	1,558	TBD
(U) Appropriated Value	1,482	1,500			
(U) Adjustments to Appropriated Value					
a. Cong Reductions	-48	-4			
b. SBIR	-37				
c. Omnibus or Other Above Threshold Reprogram	-10				
d. Below Threshold Reprogramming					
(U) Adjustments to Budget Years Since FY 1999 PB			-28	-29	
(U) Current Budget Submit/FY 2000 PB	1,387	1,496	1,500	1,529	TBD

(U) Significant Program Changes: Not Applicable

(U) D. Other Program Funding Summary ($ in Thousands): Not Applicable

(U) E. Acquisition Strategy: Accomplish through intergovernmental transfer between the Department of Defense and the Department of Commerce.

(U) F. Schedule Profile: Not Applicable

RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)	DATE February 1999
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(U) A. Project Cost Breakdown ($ in Thousands)

	FY 1998	FY 1999	FY 2000	FY 2001
(U) Quality Assurance (Develop Measurement Standards & Calibration Support)	1,360	1,418	1,471	1,499
(U) Travel	27	28	29	30
(U) Identified as a source for SBIR		50		
(U) Total	1,387	1,496	1,500	1,529

(U) B. Budget Acquisition History and Planning Information ($ in Thousands)

Performing Organizations:

Contractor or Government Performing Activity	Contract Method/Type or Funding Vehicle	Award or Obligation Date	Performing Activity EAC	Project Office EAC	Total Prior to FY 1998	Budget FY 1998	Budget FY 1999	Budget FY 2000	Budget FY 2001	Budget to Complete	Total Program
Identified as a source for SBIR							50				
Product Development Organizations											
National Institute of Standards & Technology	MIPR (DD FORM 448)	1st QTR	TBD	TBD	12,269	1,360	1,418	1,471	1,499	Continue	TBD
AFMC	In House	Various	TBD	TBD	118	27	28	29	30	Continue	TBD
Support and Management Organizations											
Test and Evaluation Organizations											

RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)		DATE: February 1999
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Government Furnished Property: N/A

Item Description	Contract Method/Type or Funding Vehicle	Award or Obligation Date	Delivery Date	Total Prior to FY 1998	Budget FY 1998	Budget FY 1999	Budget FY 2000	Budget FY 2001	Budget to Complete	Total Program
Identified as a source for SBIR						50				
Subtotal Product Development				12,387	1,387	1,446	1,500	1,529	Continue	TBD
Subtotal Support and Management				0	0	0	0	0	0	0
Subtotal Test and Evaluation				0	0	0	0	0	0	0
Total Project				12,387	1,387	1,496	1,500	1,529	Continue	TBD